

PERIapsis Subsurface Cave Optical Explorer (PERISCOPE)

Completed Technology Project (2015 - 2017)

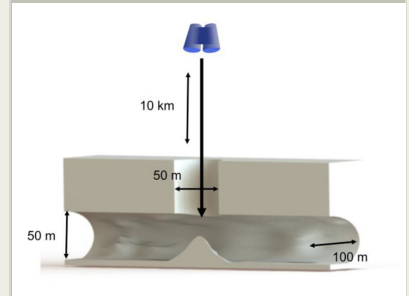


Project Introduction

PERISCOPE is an instrument and mission concept with the goal of investigating and mapping lunar skylights from an orbiting platform using photon time-of-flight imaging. A spacecraft in a very low orbit would direct laser pulses into the lunar skylights, detect light returning to the spacecraft after multiple reflections in the cave, and transmit a summary of those data back to the Earth. A team on the ground would process that data to develop a 3d map of the interior void of the skylight that was at all times beyond the direct line of sight of the spacecraft. In phase I we showed the theoretical feasibility of this mission concept with a variety of simulations and analytical tools. In phase II we intend to bring this concept to a level capable of supporting a full mission proposal. We will perform more detailed trade studies, analyses, and experiments using real world materials as analogous to expected lunar subsurface material as possible.

Anticipated Benefits

The proposed phase 2 work will result in a clearly defined mission with a well defined target, spacecraft, and instrument. The instrument concept can be further developed via the PICASSO ROSES call and further concepts involving the instrument can be explored. Selecting this Phase 2 proposal will open a whole new avenue of exploration for the solar system. The processes we will use in the Phase 2 are well known to NASA. JPL's A team and Team x are recognized across NASA as valuable processes to develop mission concepts, and the instrument development plan continues a common process of instrument development at a university in partnership with a NASA center for mission development. Further the mission is likely to be within the Discovery cost cap, and possibly in the Explorer program cost cap.



Artist depiction of PERIapsis Subsurface Cave Optical Explorer

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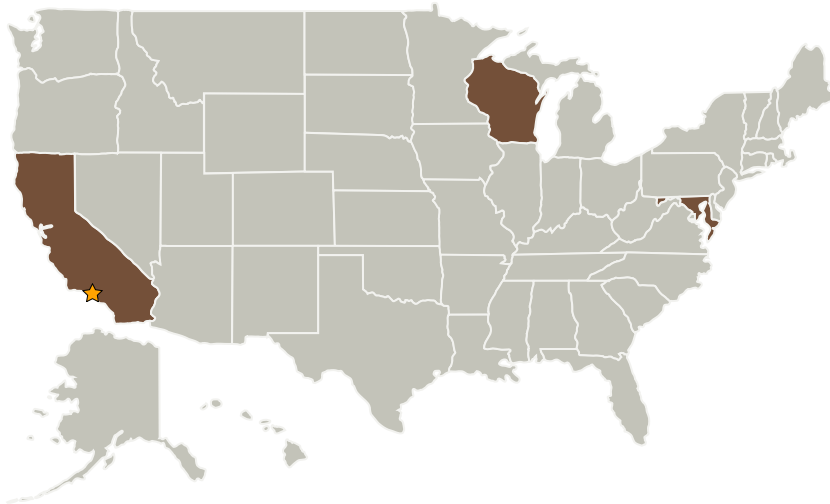
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Jet Propulsion Laboratory (JPL)	Lead Organization	NASA Center	Pasadena, California
Morgridge Institute for Research	Supporting Organization	R&D Center	

Primary U.S. Work Locations	
California	Maryland
Wisconsin	

Project Transitions

 **July 2015:** Project Start **June 2017:** Closed out

Closeout Link: <https://www.nasa.gov/feature/periscope-periapsis-subsurface-cave-optical-explorer>

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

NASA Innovative Advanced Concepts

Project Management

Program Director:

Jason E Derleth

Program Manager:

Eric A Eberly

Principal Investigator:

Jeffrey P Nosanov

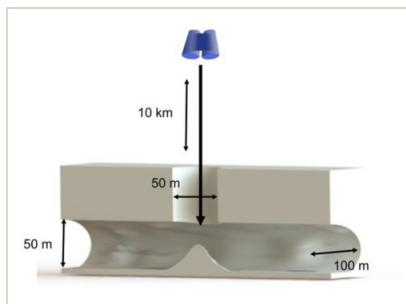
Co-Investigators:Andreas Velten
Nitin Arora
Stephen F Dawson
Karl L Mitchell

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Images



Project Image

Artist depiction of PERIapsis Subsurface Cave Optical Explorer (<https://techport.nasa.gov/image/102143>)

Links

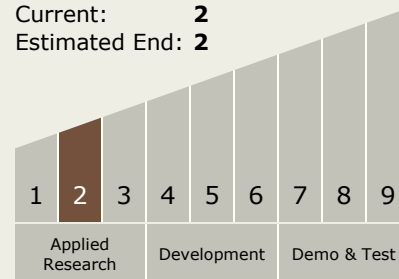
NASA.gov Feature Article (<https://www.nasa.gov/feature/periscope-periapsis-subsurface-cave-optical-explorer>)

Project Website:

<https://www.nasa.gov/directorates/spacetech/home/index.html>

Technology Maturity (TRL)

Start: **2**
Current: **2**
Estimated End: **2**



Technology Areas

Primary:

- TX01 Propulsion Systems
 - TX01.3 Aero Propulsion
 - TX01.3.9 Hybrid Electric Systems

Target Destination

Mars